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DESCRIPTION OF *COLOMASTIX JANICEAE* N. SP., A COMMENSAL AMPHIPOD (GAMMARIDEA: COLOMASTIGIDAE) FROM THE FLORIDA KEYS, USA

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During November of 1968 and 1973 and June of 1970 more than 100 specimens of an undescribed commensal amphipod belonging to the genus *Colomastix* Grube, 1861, were collected from loggerhead sponges, *Spheciospongia vesparia* (Lamarck), in the lower Florida Keys. Additional specimens of this new species, collected from Dry Tortugas, Florida, were borrowed from the Division of Crustacea of the U.S. National Museum of Natural History.

Until the recent description of the genus *Yulumara* Barnard, 1972, from Australia, *Colomastix* was the only recognized genus in the family Colomastigidae. Although there is little ecological information available on the family, its members are generally considered to be closely associated or symbiotic with sessile marine invertebrates, especially sponges. The phylogenetic position of the Colomastigidae is still unsettled. Bousfield (1973) stated that the family was "apparently derived from stenothoid-like ancestors," whereas Barnard (1974) tentatively linked it with the dexaminid families (Ampeliscidae and Dexaminidae).

In his comprehensive monograph on the gammaridean Amphipoda, Stebbing (1906) recognized *Colomastix pusilla* Grube, 1961; *C. brazieri* Haswell, 1880; and *C. hamifera* Kossman, 1880, as the only valid known species of *Colomastix*. He stated, however, that *C. hamifera* might be a juvenile male of *C. pusilla*. In this same work Stebbing listed *Cratippus tenuipes* Bate, 1862; *Cratippus crassimanus* Heller, 1866; and *Exungia stilipes* Norman, 1869, as synonyms of *C. pusilla*. Walker (1909) recognized *Cratippus* as a synonym of *Colomastix*, but considered *C. crassimanus* (Heller) as valid, a designation not accepted by later authors. Since the work of Stebbing (1806), 10 species have been described: *C. fissilingua* Schellenberg, 1926; *C. castellata* K. H. Barnard, 1932; *C. simplicauda* Nicholls, 1938; *C. magnirama* Hurley, 1954; *C. subcastellata* Hurley, 1954; *C. japonica* Bulycheva, 1955; *C. lunalilo* J. L. Barnard, 1970; *C. kapiolani* J. L. Barnard, 1970; *C. halichondriae* Bousfield, 1973 and *C. keiskama* Griffiths, 1974. See Della Valle (1893), Stebbing (1906), Schellenberg (1926), Hurley (1954), J. L. Barnard (1955) for additional references to the early literature on *Colomastix*. More recent studies by Ledoyer (1968), Bellan-Santini (1972) and Bellan-Santini and Ledoyer (1973, 1974) give additional information on the distribution and ecology of *Colomastix pusilla* and *C. fissilingua*. Table 1 lists the species of *Colomastix* and the localities

from which they were originally described and presents a comparison of several important taxonomic characters. *Colomastix hamifera*, a probable synonym of *C. pusilla*, is not listed due to lack of information on important characters (i.e., nature of inner plate of maxilliped).

Specimens collected during this study were fixed in 10% formaldehyde solution and transferred to 70% ethanol within 48 h. Dissected parts were studied in temporary water or glycerine preparations or mounted on slides in Turtox water soluble mounting medium. Illustrations were made with the aid of camera lucidas.

Colomastix janiceae, new species
Figs. 1–4

Colomastix pusilla.—Pearse, 1932 (in part).

Diagnosis.—Relatively large species, female and male reaching lengths (excluding antennae) of 7.5 and 9.3 mm, respectively. Head of male much larger than that of female, length approximately equal to that of first 2 thoracic segments. Prominent supra-epistomal process present in both sexes, widely separated from epistome in mature male. Inner plate of maxilliped completely fused, acutely triangular. Dactyl of male gnathopod 2 reaching posteriorly less than ⅓ length of propodus (palm). Gills well-developed; in female those of gnathopod 2 reaching over ⅔ length of basis (second segment) and those of legs 1–4 distinctly longer than basis. Long simple setae on dorsal surface of pleopod peduncular segments of adult male. Inner ramus of uropod 1 distinctly longer in male; subequal in female. Outer ramus of uropod 3 approximately ⅔ that of inner ramus. Telson subtriangular, distal ¾ of margin with 15–20 castellations.

Description.—Body subcylindrical, narrower in male than in female, flattened slightly dorsoventrally. Length of adult males 6.5–9.4 mm; adult females (i.e., marsupium formed) 5.5–7.5 mm.

Head: Wider than long in both sexes. Adult male: enlarged, approximately equal in length to first 2 thoracic segments. Female and subadult male: head and first thoracic segment subequal in length. Eyes with 16–20 facets; orange-yellow in life, pale yellow in specimens preserved in 70% ethanol. Rostrum and interantennal (subrostral) process subequal and acute (Fig. 4K); ventral margins of interantennal process slightly raised producing a shallow medial depression. Sharp-edged interantennal ridge concave (Fig. 4A, B, K). Indentation of supraantennal ridge reaching no farther than middle of eye. Epistome well developed in both sexes. Prominent antero- (supra) epistomal process (or keel) present in both sexes, directly adjacent to epistome in adult female (Fig. 4B) and widely separated from epistome in adult male (Fig. 4A) (due to elongation of head in mature male).

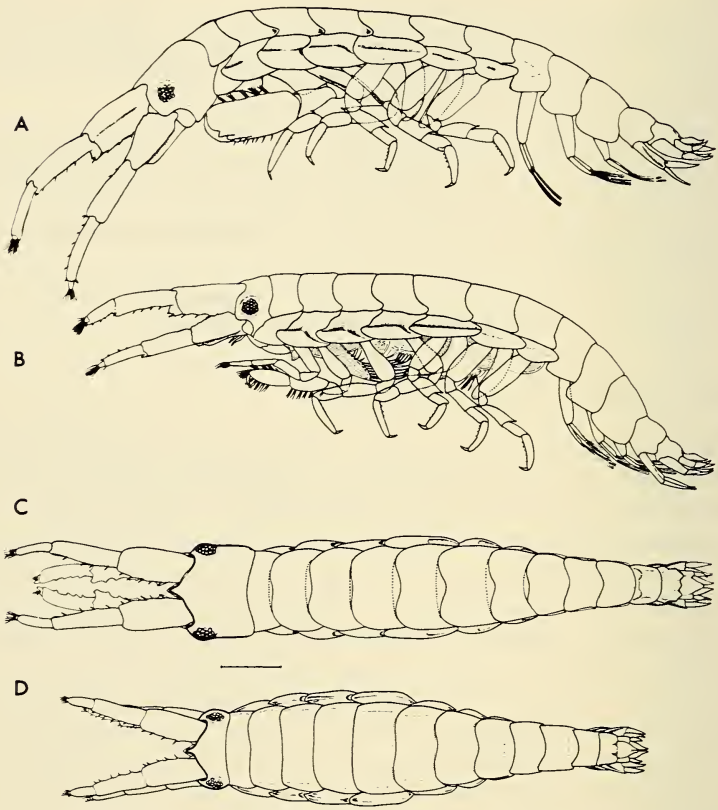

Fig. 1. *Colomastix janiceae*. A, Adult male (9.3 mm), lateral view; B, Adult female (7.5 mm), lateral view; C, Adult male, dorsal view; D, Adult female, dorsal view. Scale = 1 mm.

Antennae: Subequal in length; approximately ⅓ length of body in both sexes. Antenna 1: First peduncle segment approximately equal to second, third nearly ⅔ length of second; ventral and inner ventral margin of third peduncular segment of male with relatively long, simple, spine-setae (Fig. 2B, E); ventral and inner ventral margin of third peduncular segment of female with short spines, each with a subapical sensory hair; flagella with 3 visible segments bearing long spine setae and sensory aesthetascs (Fig. 2E, F). Antenna 2: Fourth peduncle segment about ¼ longer than third, length of third and fifth peduncle segments nearly equal; flagella with 3 visible segments, first much larger and longer than other 2 combined; spination of fourth peduncle segment and size of flagellum segment 1 differ with sex (Fig. 2G, H). See Fig. 2A–H for additional details on the spination, setation and morphology of antennae 1 and 2.

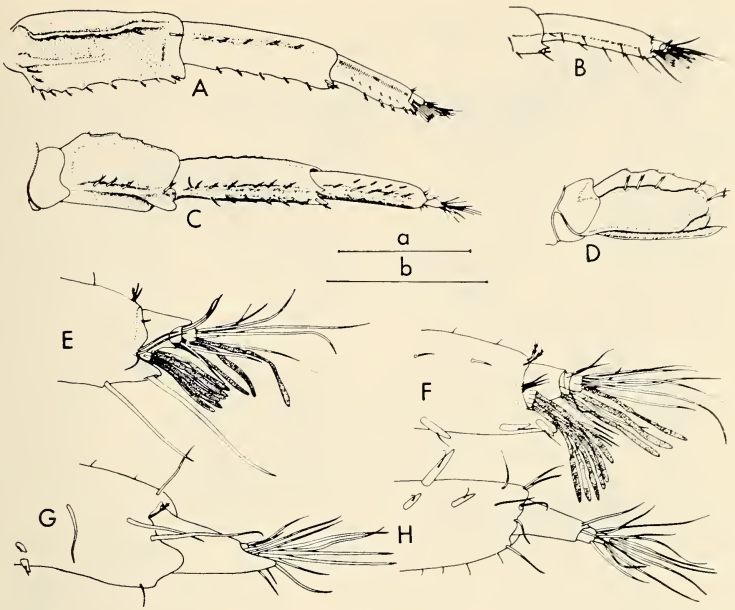

Fig. 2. *Colomastix janiceae*. A, Ant. 1 ♀ inner view; B, Ant. 1 ♂ inner view, last ped. seg. showing long setae along ventral and inner ventral margin; C, Ant. 2 ♀ inner view; D, Ant. 2 ♀ showing details of basal ped. segs.; E, Ant. 1 ♂ showing detail of last ped. seg. and flagellum (inner lateral aspect); F, Ant. 1 ♀ showing detail of last ped. seg. and flagellum (inner lateral aspect); G, Ant. 2 ♂ showing detail of ped. seg. and flagellum (ventrolateral view); H, Ant. 2 ♀ showing detail of last ped. seg. and flagellum (lateral inner view). Scale: A = 0.5 mm; B = 0.1 mm.

Mouthparts: Mandibles small, ending in 5 strong spine-teeth, distalmost spine-tooth with trifid tip (Fig. 4F); molar process small, blunt, with concave medial face. Upper lip suboval, with fine short setae along rounded lateral and apical margins. Maxilla 1 (Fig. 4G) cheliform in appearance, relationship and origin of segments diffieult to interpret, 3 or possibly 4 articles present; daetiliform (1 artiele) palp (?) opposing acutely tipped distal lobe of outer plate; inner plate (?) a small, finely setose lobe (vestigial) loeated medially on inner face of basal segment (Fig. 4E). Maxilla 2 (Fig. 4H) bilobed, smaller than maxilla 1, outer lobe narrower and longer than inner; both lobes with apical and subapical setae. Maxilliped (Fig. 4I) forming opercular eap over other mouthparts; inner plate acutely triangular, entire (not distally eleft); outer plate with relatively straight distal margin and with 2 setae on lateral margin (inner noticeably larger than outer); palp with 4 segments; inner distal margin of segment 2 with a single seta; inner margin of segment 3 pubescent, with 2 strong proximal setae and single small more distal seta, single distal setae on outer margin

Fig. 3. *Colomastix janiceae*. A, Distal end gnath. 2 of 6.5 mm ♂, outer aspect; B, Gnath. 2 of 6.5 mm ♂, inner view of last 3 segs.; C, Gnath. 2 large (9.3 mm) ♂, inner view; D, Gnath. 1 of 6.5 mm ♂; E, Gnath. 1 large (9.3 mm) ♂; F, Gnath. 1 adult ♀; G, Gnath. 2, coxal plate and gill, adult ♀; H, Pereopod 2, coxal plate, oostegite, and gill of adult ♀; I, Pereopod 4, coxal plate and gill of adult ♀; J, Telson of adult ♀, dorsal view; K, Ventral view of abdomen of 6.5 mm ♂ showing penal organs at base of 5th pereopod; L, Pleopod 3 of adult ♀ (ant. aspect); M, Pleopod 3 of 9.3 mm ♂ (ant. aspect); N, U1 of adult ♀; O, U2 of adult ♀; P, U3 of adult ♀. Scales: a = 0.5 mm (Figs. A–I), b = 1.0 mm (Fig. K), c = 0.5 mm (Figs. J, L–O).

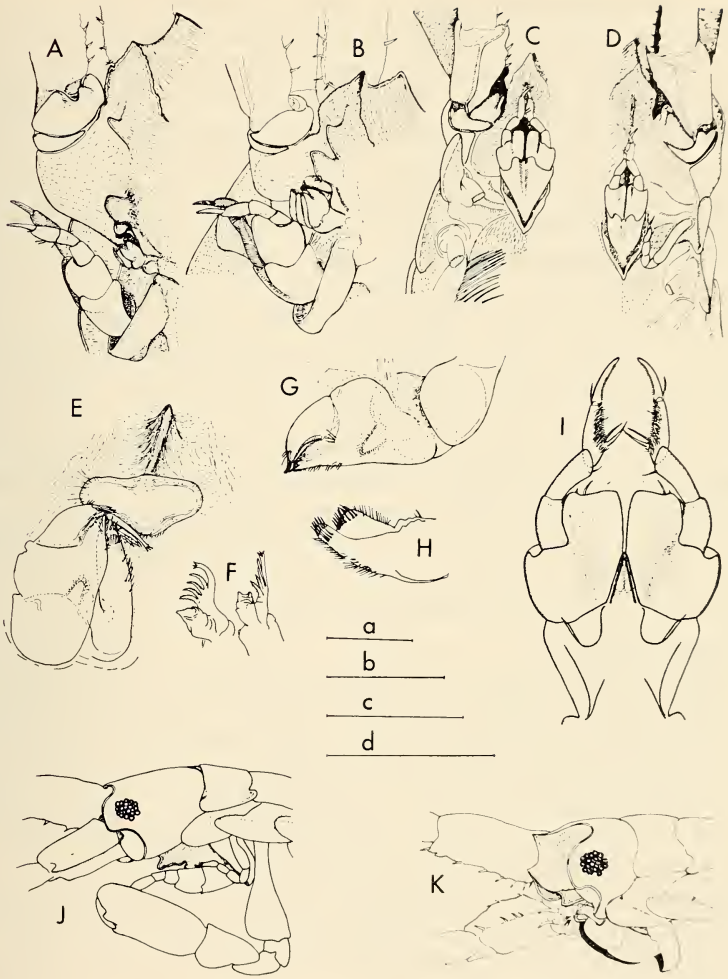

Fig. 4. *Colomastix janiceae*. A, ventrolateral view of head and mouthparts, 9.3 mm ♂; B, Same, adult ♀; C, Ventral view of head and mouthparts, adult ♀; D, Same, 9.3 mm ♂; E, Ventral aspect max 1, max 2, upper lip, and epistome of adult ♀; F, Two ventral views of mandible of adult ♀; G, Max 1 of adult ♀; H, Max 2 of adult ♀; I, Mxpd of adult ♀; J, 6.5 mm ♂, lat. view of anterior end; K, Adult ♀, lateral view of anterior end. Scale: a = 0.5 mm (Figs. A, B); b = 1.0 mm (Figs. C, D, J, K); c = 0.2 mm (Figs. E–H); d = 0.5 mm (Fig. 1).

at joint with dactyl; segment 4 (dactyl) over ¾ length of segment 3, inner margin finely pectinate. Mouthparts of adult male smaller than those of adult female (Fig. 4A–D).

Gnathopod 1—adult male: Atrophied, greatly reduced in size (Fig. 4D);

propodus with small dactyl and 1–6 distal spines (Fig. 3D) [large adult male (9.5 mm) with only 1 small blunt distal spine (Fig. 3E), smaller adult male (6.5 mm) with 6 distal spines, 2 more strongly developed than others (Fig. 3D)]; propodus longer than carpus. Subadult male: resembling that of female. Female (adult and subadult): not reduced in size; propodus with distal brush of 7–8 curved compound setae and elongate, spine-like dactyl (Fig. 3F); propodus slightly shorter than carpus.

Gnathopod 2—adult male (Fig. 3A–C): Well developed; propodus (palm) with 3 strong distoventral teeth opposing dactyl; dactyl reaching posteriorly less than ⅓ length of palm, a blunt low tooth or tooth-ridge on mid-ventral margin in large adult male; ventral margin of carpus rounded, not acutely produced; distal portion of basis dilated with rounded margins (Fig. 3C). Subadult male: similar to that of adult female. Adult and subadult female with simple or marginally subchelate (Fig. 3G) propodus and carpus subequal in length. Setation of gnathopod 2 (both sexes) as illustrated (Fig. 3A–C, G); part of ventral inner faces of propodus, carpus and merus pubescent in adults of both sexes (Fig. 3C, G).

Pereopods: Typical of genus, 1–2 longer than 3–5; 3–5 with orientation reversed; distal end of article 2 (basis) of pereopod 5 wider than that of pereopod 1 or 2; article 6 (propodus) longer than article 4 or 5, article 4 longer than article 5.

Coxal plates (Figs. 1; 4J, K): Strongly developed; 2–7 with medial longitudinal ridge, more strongly developed on plates 2–5, more prominent on adult female than on male and subadult; anterior margins of plates 2–5 overlapping posterior margins of preceding plates, anterior margins of plates 6–7 covered by posterior margin of preceding plates; anterior margin of plates 2–4 in adult male and 2–5 in adult female projected forward forming a blunt process, more prominent in adult female.

Pleopods: Peduncular segments stout, equal in width; those of pleopod 1 slightly longer than those of second and about ¼ longer than those of third pair; width–length ratios (from anterior to posterior) 4:11, 2:5 and 1:2; inner distal margin of each segment armed with pair of coupling setae (Fig. 3L); segments 1–3, respectively, in adult male, with 0–2, 20–23 and 7–9 long simple setae near margin on dorsal surface near inner distal margin (Fig. 3M); no such setae on peduncle segments 1–3 of female. Rami equal in length with 4 articles, article 1 longer than distal 3 articles combined; inner medial margin article 1 (anterior to posterior) with 3–4, 3, and 2–3 compound setae, respectively (Fig. 3L, M); rami (outer and inner) with long compound swimming setae, 1 pair originating at distal end of each article; rami (excluding setae) distinctly shorter than peduncle segments.

Uropods: Rami (both sexes) lanceolate with margins finely pectinate, tips of U2 reaching nearly to tips of U3. Female: rami of U1 narrow and lanceolate, equal in length and slightly shorter than peduncle; peduncle

⅕ longer than that of U2 and twice the length of peduncle U3. Outer ramus of U3 narrower and slightly shorter than inner, length of inner ramus nearly equal to peduncle length. Inner ramus of U3 robust, ⅓ longer than outer peduncle, width over ⅔ length; peduncle and outer ramus nearly equal in length. Male: outer ramus of U1 much narrower and nearly ⅓ shorter than that of inner. U2 and 3 similar to those of female.

Telson (Fig. 3J): Subtriangular, distal ¾ nearly triangular with 15–20 relatively inconspicuous castellations; 3–4 pairs of inconspicuous small setae on dorsal surface near margins, 1 minute pair at tip. Female: width approximately ⅝ length. Male: narrower with tip slightly turned up.

Holotype.—Adult female, USNM No. 152666.

Paratype.—Adult male, USNM No. 152667.

Type-locality.—Molasses Keys (Florida Keys), 27 November 1969, depth 1 m.

Other localities.—Key West and Dry Tortugas, Florida.

Habitat.—In sponges, principally *Spheciospongia vesparia* (Lamarck).

The species is named in honor and memory of the late Edna Janice Heard, a beautiful and rare person.

Comparisons and Discussion

Colomastix janiceae, *C. pusilla*, *C. japonica*, *C. lunalilo*, and *C. keiskama* are the only described species reported to have the inner plate of the maxilliped entire or completely fused. The condition of the inner plate in *C. brazieri* and *C. halichondriae* was not determined; however, we examined specimens of *C. halichondriae* from Georgia (USA) and found the inner plate to be completely fused. In another species, *C. magnirama*, only a shallow cleft is reported present on the distal tip of the inner plate. The structure of the telson, the greatly enlarged inner ramus of uropod 3, and the pronounced carpal tooth on pereopods 3–5 further distinguish *C. magnirama* from *C. janiceae*. The similarity of gnathopod 1 in both sexes, and the outer ramus of uropod 3 being half or less as long as the inner, separate *C. brazieri*, *C. japonica*, and *C. lunalilo* from *C. janiceae*. The much smaller body size, gnathopods 1 being similar in both sexes, and the shape and relatively smooth margin of the telson distinguish *C. halichondriae* and *C. keiskama* from *C. janiceae*. Of the described species, *Colomastix janiceae* is most similar and apparently most closely related to *C. pusilla* (*sensu stricto*). The gnathopods of *C. pusilla* and *C. janiceae* have the same general morphology. In the adult male, gnathopod 1 of both species is greatly reduced in size (vestigial); however, *C. pusilla* has much smaller gills, a more finely castellate (or serrate) telson margin, and the rami of uropods 1 and 3 are nearly equal in both sexes.

Like *C. pusilla* and *C. janiceae*, the "*C. pusilla*" of J. L. Barnard (1955) from Hawaii has gnathopod 1 greatly reduced in the adult male. Based

Table 1. Comparison of 13 speeies of *Colomastix*.

Speeies	Maximum known body length (mm)	Inner plate of maxilliped	Baekward extension of dactyl of male G2	Margin of telson	Length outer ramus U3	Development gnathopod I adult male	Type locality	References
C. pusilla	5.0	entire	<½ length of propodus	distal ¾ serrate or finely castellate	≃ inner	vestigial	Napoli, Italy	Chevreux & Fage (1925), Della Valle (1893), present study
C. janiceae	9.3	entire	<½ length of propodus	distal ¾ finely castellate or notched	≃ ⅔ inner	vestigial	Florida Keys, USA	present study
C. lunalilo	1.9	entire	<½ length of propodus	smooth	≃ ⅓ inner	like ♀	Hawaii, USA	J. L. Barnard (1970)
C. japonica	5.5	entire	<½ length of propodus	smooth	≃ ½ inner	like ♀	Sea of Japan	Bulcheva (1955)
C. halichondriae	3.0	entire	≃½ length of propodus	smooth	≃ ⅘ inner	like ♀	East Coast of USA	Bousfield (1973), present study
C. keiskama	4.0	entire	≃½ length of propodus	smooth	≃ ⅘ inner	like ♀	Cape Province East, S. Afriea	Griffiths (1974)
C. magnirama	3.0	slightly cleft	<½ length of propodus	2 shallow indentations at tip	≃ ⅙ inner	like ♀	New Zealand	Hurley (1954)
C. subcastellata	3.5	cleft	to earpus	with large castellations or notehes	≃ ⅘ inner	like ♀	New Zealand	Hurley (1954)
C. kapiolani	1.3	cleft	to earpus	2 distal notehes	≃ ⅔ inner	like ♀	Hawaii, USA	J. L. Barnard (1970)

Table 1. Continued.

Species	Maximum known body length (mm)	Inner plate of maxilliped	Backward extension of dactyl of male G2	Margin of telson	Length outer ramus U3	Development gnathopod I adult male	Type locality	References
C. castellata	4.0	cleft	<½ length of propodus	castellate	≃ ⅔ inner	like ♀	Falkland Islands 60°W, 53°S	K. H. Barnard (1932)
C. fissilingua	4.0	cleft	≃½ length of propodus	2 distal notches	≃ ⅔ inner	like ♀	S. Orkney Islands 45°W, 60°30′S	Schellenberg (1926) K. H. Barnard (1932)
C. simplicauda	3.5	cleft	unknown	smooth	≃ ⅘ inner	unknown	Macquarie Islands 158°E, 57°S	Nicholls (1938)
C. brazieri	≃10	not reported	≃½ length of propodus	not reported	≃ ½ inner	like ♀ (?)	Port Jackson, Australia	Haswell (1880)

on Barnard's description and illustrations, however, the Hawaiian specimens have a non-castellate or non-serrate telson margin and a relatively weakly toothed palm on gnathopod 2 of the male. If Barnard's observations were correct, the Hawaiian form probably represents a distinct species. As mentioned by Schellenberg (1926), some of the earlier reports of *C. pusilla*, especially those from areas other than the Mediterranean, may represent records of distinct and as yet unnamed species. For example, Bonnier's (1893) specimens of "*C. pusilla*," due to their uniquely shaped telsons (see Bonnier's figure), appear to fit into this category. We examined several lots of specimens from Dry Tortugas (Florida) identified as *C. pusilla* by Pearse (1932) and Shoemaker (unpublished records). This material contained specimens of *C. janiceae*, and those of two additional new species to be described later. One of these new forms appeared similar to the material previously reported as "*C. pusilla*" from the northern Gulf of Mexico by Pearse (1912) and the other, a small species (2 mm) is characterized by the male having the inner ramus of uropod 1 greatly enlarged and curved dorsally.

In addition to Pearse's reports (1912, 1932) there are two other published records of "*C. pusilla*" from the Northwestern Atlantic. Based on a single male specimen, Kunkel (1910) reported *C. pusilla* from Bermuda. Examination of the description and figure indicates that the Bermuda specimen has closer affinities with *C. pusilla* than with *C. janiceae*. Additional material from Bermuda will have to be examined before any firm conclusions can be drawn. Shoemaker (1942) identified a female specimen, collected from Isla de Providencia in the Caribbean, as *C. pusilla*. The fact that *C. janiceae* and at least 2 undescribed species of *Colomastix* from the Caribbean and adjacent areas have been confused with *C. pusilla* previously (Pearse, 1912, 1932; Shoemaker, unpublished records) makes Shoemaker's 1942 record questionable. Although *C. hamifera* and *C. crassicornis*, described from the Red Sea and the Adriatic, respectively, have been considered synonyms or possible synonyms of *C. pusilla* (Della Valle, 1893; Stebbing, 1906; Hurley, 1954), such designations should be only tentative pending studies of additional specimens from their type-localities.

Specimens of *Colomastix janiceae* occurred in all of the 15 *Spheciospongia vespara* we examined. Eight of these sponges were from Molasses Keys and 7 were from Key West; all were collcted from depths of less than 2 m. In the Florida Keys we observed the following animals associated with *C. janiceae* in the canals of *S. vespara*: *Synalpheus brooksi* Coutière, *Synalpheus pectinger* Coutière, *Typton tortugae* McClendon, *Balanus declivis* Darwin, *Nebalia* cf. *bipes* (Fabricius), *Leucothoe* spp., *Trypanosyllia zebra* (Grube), and large numbers of harpacticoid copepods. In general these animal associates are similar to those reported by Pearse (1932) from *S. vespara* at Dry Tortugas. In 2 studies on the biocoenoses of *S. vespara* and

other sponges from the Bahamas, Pearse (1950) and Jaronski (1969) did not report finding specimens of *Colomastix*.

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